

Appl. No. 10/799,204
Amdt. Dated August 7, 2006
Reply to Office Action of May 1, 2006

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REMARKS/ARGUMENTS

Claims 1-3, and 5-7 are pending in the present application.

This Amendment is in response to the Final Office Action mailed May 1, 2006 to support a Request for Continued Examination (RCE) filed concurrently. In the Final Office Action, the Examiner rejected claims 1-2, and 5-7 under 35 U.S.C. §102(b); and claim 3 under 35 U.S.C. §103(). Applicants have amended claim 1, 2, 6, and 7; and added new claims 24-27. Applicants submit that the newly added claims introduce no new matter. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Response to Examiner's Arguments

In the Final Office Action, the Examiner contends that in Merriam Webster Online Dictionary, the word coat is "to cover or spread with finishing, protecting or enclosure". The Examiner then concludes that encapsulating is a form of coating as Nagy discloses. Applicants respectfully disagree.

First, Nagy merely discloses encapsulating the three bonded-together stack of assemblies 5, 7, and 9 with molding compound, not coating a surface of the heat spreader body. Encapsulating is a process totally different from coating. It includes first transferring the components into mold cavities, then forcing the liquefied mold compound into the cavities. The liquefied mold compound then solidifies to encapsulate the components. In contrast, coating the surface of the heat spread body may include dipping the heat spread body in, or spraying the heat spread body with, a solution of the organic surface protectant.

Second, as argued in the previous response, since the heat spreader 30 is bonded to the die attach pad 30 before molding, it is impossible to coat the heat spreader 30 with the molding compound.

Rejection Under 35 U.S.C. § 102

In the Final Office Action, the Examiner rejected claims 1-2, and 5-7 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,139,973 issued to Nagy et al. ("Nagy") using the extrinsic evidence provided by U.S. Patent No. 2,700,185 issued to Max M. Lee et al.

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("Lee"). Applicants respectfully traverse the rejection and contend that the Examiner has not met the burden of establishing a prima facie case of anticipation.

Nagy discloses a method for making a semiconductor package with the distance between a lead frame die pad and heat spreader determined by the thickness of an intermediary insulating sheet. A first assembly 5 includes a lead frame 10 with a die attach pad 12 and a die 14 mounted on the die attach pad 12 (Nagy, col. 2, lines 45-48). A second assembly 7 includes a sheet 20 of a fully cured polymeric material. A thin layer 24 of an adhesive material coats both sides of the sheet 20 (Nagy, col. 2, lines 52-60). A third assembly 9 includes a heat spreader 30. A dollop 32d of uncured epoxy resin is dispensed on the top surface of a heat spreader 30 (Nagy, col. 2, lines 63-66; col. 3, lines 1-3). The three assemblies 5, 7, and 9 are registered in a stack so that the dollop 32d is aligned with the die attach pad 14. The stack is held compressed between the hot platens 39 and 40 until the epoxy coatings 24 are at least partially cured. The lead frame 10 carrying the bonded-together stack of assemblies 5, 7, and 9 is placed in a standard mold into which an insulative molding compound is introduced to encapsulate the stack (Nagy, col. 3, lines 60-63).

Lee discloses a thermoplastic casting compositions. A thermoplastic material has properties to serve as an insulating and potting composition at high frequencies (Lee, col. 1, lines 22-26).

Nagy and/or Lee does not disclose, either expressly or inherently, at least one of (1) coating a surface of a thermally conductive heat spreader body with an organic surface protectant; and (2) coupling the heat spreader body to a thermal interface material, the thermal interface material being in contact with an integrated circuit (IC) die.

Nagy merely discloses an insulative molding compound introduced to encapsulate the stack (Nagy, col. 3, lines 62-63). Nagy is distinguished from the claimed invention in a number of aspects. First, the molding compound is used to encapsulate the three assemblies 5, 7, and 9. It is not coated on the surface of the heat spread body. Encapsulating is a process totally different from coating. It includes first transferring the components into mold cavities, then forcing the liquefied mold compound into the cavities. The liquefied mold compound then solidifies to encapsulate the components. In contrast, coating the surface of the heat spread body may include dipping the heat spread body in, or spraying the heat spread body with, a solution of

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the organic surface protectant. To clarify this aspect of the invention, claim 1 has been amended. Second, coating the heat spreader is impossible because the molding step is performed after the stack is held compressed between the hot platens 39 and 40 (Nagy, col. 3, lines 39-42). The deformed dollop 32s is heated to bond it to the die attach pad 12 and the heat spreader 30 (Nagy, col. 3, lines 45-49). Since the heat spreader 30 is bonded to the die attach pad 30 before the molding, it is impossible to coat a surface of the heat spreader 30 with the molding compound. Third, the molding compound is not an organic surface protectant. Lee may indicate that plastic is organic, but Lee does not disclose that a molding compound is an organic surface protectant. An organic surface protectant is an organic solderability preservative. Fourth, the dollop is not in contact with the die. It is bonded to the die attach pad 12 (Nagy, col. 3, lines 45-48).

Regarding claim 2, the Examiner contends that Nagy discloses dipping the heat spreader body into a solution comprising the organic surface protectant (Final Office Action, page 3, first paragraph). Applicants respectfully disagree. As discussed above, encapsulating involves forcing the mold compound into a mold cavity, not dipping the component in a solution. Furthermore, encapsulation does not involve spraying the body with the solution as recited in new claim 24.

Applicants further contend that Nagy does not disclose, suggest, or render obvious any of the elements recited in new claims 25-27.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Vergegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989). Since the Examiner failed to show that Nagy teaches or discloses any one of the above elements, the rejection under 35 U.S.C. §102 is improper.

Therefore, Applicants believe that independent claim 1 and its respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §102(b) be withdrawn.

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Rejection Under 35 U.S.C. § 103

In the Final Office Action, the Examiner rejected claims 3 under 35 U.S.C. §103(a) as being unpatentable over Nagy in view of U.S. Patent No. 5,110,494 issued to Beck ("Beck"). Applicants respectfully traverse the rejection and contend that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *MPEP* §2143, p. 2100-129 (8th Ed., Rev. 2, May 2004). Applicants respectfully contend that there is no suggestion or motivation to combine their teachings, and thus no *prima facie* case of obviousness has been established.

Nagy discloses a method for making a semiconductor package as discussed above.

Beck discloses an alkaline cleaner and process for reducing stain on aluminum surfaces. The alkaline cleaner compositions may contain one soluble heterocyclic compound (Beck, col. 3, lines 39-41). The heterocyclic compound may be nitrogen-containing heterocyclic compounds (Beck, col. 3, lines 47-49). Examples of unsaturated nitrogen-containing heterocyclic compounds include triazoles (Beck, col. 3, lines 58-61).

Nagy and Beck, taken alone or in any combination, do not disclose, suggest, or render obvious, at least one of (1) coating a surface of a thermally conductive heat spreader body with an organic surface protectant; and (2) coupling the heat spreader body to a thermal interface material, the thermal interface material being in contact with an integrated circuit (IC) die, and (3) wherein the organic surface protectant comprises one or more triazole compounds and/or salts thereof.

Nagy does not disclose or suggest elements (1) and (2) as discussed in the 102(b) rejection above. Accordingly, a combination of Nagy with any other reference in rejecting claim 3 is improper. Since Nagy does not disclose using an organic surface protectant, Nagy does not disclose or suggest triazole compounds. Furthermore, Beck merely discloses using triazole as a cleaner to reduce the discoloration of aluminum surfaces treated with aqueous alkaline cleaner

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compositions (Beck, col. 2, lines 37-40). Beck does not disclose or suggest using triazole as an organic surface protectant to coat a heat spreader. Cleaning is different than coating because it does not leave a layer of the material on the surface.

There is no motivation to combine Nagy and Beck because neither of them addresses the problem of coating heat spreaders. There is no teaching or suggestion that coating the heat spreader with an organic surface protectant is present. Nagy, read as a whole, does not suggest the desirability of coating the heat spreader. For the above reasons, the rejection under 35 U.S.C. §103(a) is improperly made.

When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Co., Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). "When determining the patentability of a claimed invention which combined two known elements, 'the question is whether there is something in the prior art as a whole suggest the desirability, and thus the obviousness, of making the combination.'" In re Beattie, Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 730 F.2d 1452, 1462, 221 USPQ (BNA) 481, 488 (Fed. Cir. 1984). To defeat patentability based on obviousness, the suggestion to make the new product having the claimed characteristics must come from the prior art, not from the hindsight knowledge of the invention. Interconnect Planning Corp. v. Feil, 744 F.2d 1132, 1143, 227 USPQ (BNA) 543, 551 (Fed. Cir. 1985). To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. In other words, the Examiner must show reasons that a skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the prior elements from the cited prior references for combination in the manner claimed. In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1996), 47 USPQ 2d (BNA) 1453. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed invention or the Examiner must

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present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973. (Bd.Pat.App.&Inter. 1985). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." In re Mills 916 F.2d at 682, 16 USPQ2d at 1432; In re Fitch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

In the present invention, the cited references do not expressly or implicitly suggest any of the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Nagy and Beck is an obvious application of coated heat spreaders.

Therefore, Applicants believe that independent claim 1 and its respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §103(a) be withdrawn.

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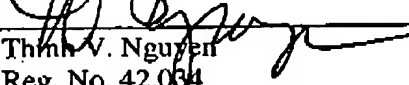
Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: August 7, 2006

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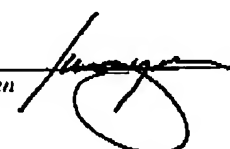
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